

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-39 (Cancelled)

Claim 40 (Currently Amended)

A method of reacting reactants in the presence of diluent, the method comprising:

- configuring a reactor comprising a reaction chamber with an outlet; the ~~reactor~~ reaction chamber having a streamwise curvilinear primary fluid-flow direction and a first and a second transverse directions mutually distinct and transverse to ~~mutually distinct from the primary streamwise-flow~~ direction, the first and second transverse directions defining a surface through a reaction ~~reactor~~ chamber ~~location transverse to the flow~~;
- configuring a reactant delivery system and delivering a reactant fluid comprising reactant to the ~~reactor~~ reaction chamber;
- configuring a co-reactant delivery system and delivering a co-reactant fluid comprising an oxidizing ~~the co-reactant to the reactor~~ reaction chamber;
- controlling ~~the a~~ a spatial delivery distribution of the reactant fluid ~~comprising reactant into the reaction chamber~~ reactor,
- wherein controlling a spatial transverse reactant distribution in the surface along in at least one of the first transverse directions;
- configuring a diluent delivery system and delivering a the diluent fluid comprising diluent into one of reactant fluid, co-reactant fluid, and product fluid, to the reactor upstream of the reactor outlet;
- controlling a spatial ~~delivery~~ distribution of ~~the a~~ a diluent fluid comprising a diluent upstream of the reactor outlet,
- wherein controlling a spatial transverse into the reactor, the diluent distribution in the surface along being taken in at least one of the first transverse directions;
- reacting reactant with co-reactant to form a reaction product, and mixing diluent with at least one of reactant, co-reactant and reaction product upstream of the reactor outlet, and

delivering to ~~the reactor~~ an outlet of the reactor a product fluid comprising reaction product, diluent and a residual component comprising ~~at least one~~ of reactant and co-reactant; and

wherein controlling the ~~at least one~~ spatial distribution of each of the reactant fluid and the diluent fluid in ~~at least one of the~~ first transverse directions controls ~~a the spatial~~ transverse distribution of ~~at least one of the~~ composition, temperature, pressure, and streamwise velocity of the product fluid, at a plurality of outlet locations along an outlet transverse direction through an outlet location near the reactor outlet, ~~in at least one of the transverse directions~~ to one of:

greater than a plurality of prescribed lower limits, and less than a plurality of prescribed upper limits at the respective outlet locations.

Claim 41 (Previously Presented)

The method of claim 40 wherein the diluent fluid comprises at least one of fluid water and carbon dioxide.

Claim 42 (Previously Presented)

The method of claim 40 further including controlling the mean outlet temperature of the product fluid exiting the reactor by controlling the amount of diluent delivered through the diluent delivery system to control the total enthalpy change relative to the heat of reaction and the fluid delivery temperatures.

Claim 43 (Currently Amended)

The method of claim 40 further including acoustically modulating the delivery of at least one of the delivered fluids thereby acoustically modulating the reacting fluid within the ~~reactor~~ reaction chamber with a frequency greater than 10 Hz.

Claim 44 (Currently Amended)

The method of claim 43 further including modulating the ~~delivery delivered of one of~~ liquid fluid to at least 100 Hz, wherein reducing fluid pressure oscillation within the reaction chamber.

Claim 45 (Currently Amended)

The method of claim 7640 further including modulating the spatial delivery of the reactant fluid into the ~~reactor~~reaction chamber a frequency greater than 10 Hz, thereby reducing to reduce fluid pressure oscillation within the ~~reactor~~reaction chamber.

Claim 46 (Currently Amended)

The method of claim 7640 further including modulating the spatial delivery of the diluent fluid into the reactor at a frequency greater than 10 Hz, thereby reducing to reduce fluid pressure oscillation within the ~~reactor~~reaction chamber.

Claim 47 (Currently Amended)

The method of claim 40 further including electrically exciting at least a portion of the reaction product within the reaction chamber~~reactor~~.

Claim 48 (Previously Presented)

The method of claim 47 further including modulating the reaction product to at least 2 kHz.

Claim 49 (Currently Amended)

The method of claim 7640 further including configuring a diffuser and diffusing the co-reactant into the reaction chamber~~reactor~~ and delivering a portion of the diluent as one of diluent vapor and steam, near the diffuser outlet.

Claim 50 (Currently Amended)

The method of claim 7640 further including configuring a diffuser, diffusing the co-reactant into the reactorreaction chamber and delivering a portion of the diluent as liquid near the diffuser outlet.

Claim 51 (Currently Amended)

The method of claim 40 wherein at least a portion of the diluent delivered by the diluent delivery system comprises one of ~~diluent~~ liquid diluent and liquid water, and is delivered as a

liquid into the reactor; wherein controlling the liquid spatial distribution to be non-uniform at a plurality of locations on the surface, the plurality of locations being taken along the first transverse direction.

Claim 52 (Currently Amended)

The method of claim 40 further including delivering liquid and vapor diluent to the reactor and wherein at least a portion of the liquid diluent is delivered to the ~~reactor~~ reaction chamber streamwise downstream of the vapor diluent delivery.

Claim 53 (Previously Presented)

The method of claim 40 wherein the reactant delivery system and the diluent delivery system are configured to form interspersed reactable and non-reactable regions and further comprising providing a traversing region of reactable fluid traversing at least one of the non-reactable regions from one reactable region to another.

Claim 54 (Previously Presented)

The method of claim 40 wherein the co-reactant comprises oxygen containing fluid, the reactant comprises a combustible fuel, and the diluent comprises at least one of a vaporizable liquid, and liquid water.

Claim 55 (Currently Amended)

The method of claim 41 further including combusting the reactant with the co-reactant within the ~~reactor~~ reaction chamber.

Claim 56 (Previously Presented)

The method of claim 40 wherein at least a portion of the diluent is delivered streamwise downstream of a rapid reaction front.

Claim 57 (Currently Amended)

The method of claim 40 further including controlling the evaporation of a vaporizable portion of diluent by controlling a streamwise primary flow direction velocity distribution of the

diluent as delivered from the diluent delivery system evaluated along at least a first transverse direction.

Claim 58 (Currently Amended)

The method of claim 40 further including controlling the streamwise evaporation distance of the diluent in the ~~reactor~~reaction chamber with respect to at least one of the transverse directions.

Claim 59 (Currently Amended)

The method of claim 7640 further including configuring a high voltage power supply for at least one of the reactant delivery system or the diluent delivery system and generating a high voltage electric field within the ~~reactor~~reaction chamber.

Claim 60 (Previously Presented)

The method of claim 59 further including modulating the high voltage electric fields.

Claim 61 (Currently Amended)

The method of claim 40 further including providing at least a portion of the ~~reactor~~reaction chamber with coolant passages, cooling at least a portion of the ~~reactor~~reaction chamber with diluent, and delivering at least a portion of the heated diluent to the ~~reactor~~reaction chamber.

Claim 62 (Previously Presented)

The method of claim 40 further including controlling the temperature of the product fluid exiting the reactor by controlling the total diluent enthalpy change comprising vaporizable diluent being delivered to the reactor.

Claims 63-75 (Cancelled)

Claim 76 (Currently Amended)

A method of reacting a reactant with a co-reactant and mixing a diluent fluid with at least one of the reactant, ~~the~~ and co-reactant, and a reaction product to form a product fluid; the method comprising:

configuring a pressurized reactor comprising an upstream diffuser and a downstream reaction chamber in fluid communication, ~~;~~ ~~the reactor with~~ having a streamwise primary fluid flow direction from a reactor inlet to outlet, and with a first and a second transverse directions mutually-distinct and transverse to from the primary flow direction, ~~the first and second transverse directions defining a surface through a reactor location transverse to the flow~~;

delivering a reactant fluid comprising the reactant with a spatial reactant distribution into the reactor~~reaction chamber~~ through a reactant delivery system;

delivering a co-reactant fluid comprising the co-reactant into the primary upstream reactor~~reaction chamber inlet~~ with a spatial co-reactant distribution; the delivery comprising diffusing the co-reactant fluid into the reactor~~reaction chamber~~ through a plurality of co-reactant diffuser passages through a co-reactant delivery system;

delivering ~~the a~~ diluent fluid comprising the diluent with a spatial diluent distribution, upstream of ~~to the reactor outlet~~ through a diluent delivery system;

wherein controlling ~~the at least one of the~~ spatial distribution of the co-reactant fluid and of the diluent fluid, the distribution being taken along in at least one of the first transverse direction through a reactor location along the primary flow in one of the diffuser and the reaction chambers; and

wherein controlling ~~at least one of the~~ transverse distribution of one of the composition, temperature, pressure, and velocity of the reaction product, to a prescribed spatial distribution, the transverse distribution being taken along in the first at least one transverse direction through a control location near the~~an~~ outlet of the reactor, ~~taken in the surface along a direction transverse to the flow~~.

Claim 77 (Cancelled)

Claim 78 (Previously Presented)

The method of claim 40 further comprising controlling the delivery of diluent fluid and

reactant fluid to the reactor to control the pressure within the reactor to within at least one specified safe operating bound of the co-reactant fluid delivery system.

Claim 79 (Currently Amended)

The method of claim 78 further comprising controlling the ~~temperature of the product fluid~~spatial transverse distribution of the product fluid temperature at a plurality of outlet locations along an outlet transverse direction through an outlet location near the reactor outlet, to greater than a plurality of prescribed lower limits, and less than a plurality of prescribed upper limits at the respective outlet locations.

Claim 80 (Currently Amended)

The method of claim ~~78-76~~ further comprising controlling the spatial distributions of the delivery of diluent fluid and of reactant fluid to the reaction chamber ~~reactor~~ wherein controlling the spatial distribution of pressure within the reactor in at least one of the transverse directions to within the at least one specified safe operating bound, and controlling the distribution of temperature of the product fluid in at least one of the transverse directions.

Claims 81-84 (Cancelled)

Claim 85 (New)

The control method of Claim 40, wherein controlling one of the reactant and diluent transverse spatial distributions to be non-uniform at a plurality of locations on the surface, the spatial distribution being taken along the first transverse direction.

Claim 86 (New)

The reaction method of Claim 76 wherein controlling one of the transverse reactant distribution and the transverse diluent distributions to be non-uniform, the spatial distribution being taken along the first transverse direction.

Claim 87 (New)

The method of claim 76 wherein at least a portion of the diluent delivered by the diluent

delivery system comprises one of liquid diluent, and is delivered as a liquid into the reactor; wherein controlling the liquid spatial distribution to be non-uniform at a plurality of locations on the surface, the plurality of locations being taken along the first transverse direction.